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## THE COURSE OF THE POLLEN TUBE IN HOUSTONIA: A PRELIMINARY NOTE

BY FRANCIS E. LLOYD

In 1902\* I announced that in certain Rubiaceae, namely in the genus *Houstonia*, the ovule is not supplied with an integument, realizing the "*nucellus nudus*" of Schleiden, a condition supposed erroneously by him to obtain in the Rubiaceae in general. At present *Houstonia* is the only genus of this family in which this peculiar and unexpected condition has been announced to occur, although it has recently been found by me that other genera closely allied to *Houstonia* are similar to it in this regard. In the paper above cited it was also shown that the course of the pollen tube in other Rubiaceous genera, namely *Richardsonia* and *Diodia*, is also of especial interest. In *Richardsonia pilosa*, the species studied, the pollen tube takes an intercellular course, the path being constant in its direction. This is true also of *Diodia teres*. *D. Virginiana*, on the other hand, offers a contrast in that for a part of the path the tube moves freely in the ovarian cavity, though in a direction in general similar to that in the other species studied. The significance of this remarkable dissimilarity I have discussed elsewhere† but it may be added that similar relations have been observed by Longo in an entirely different group of plants, the Cucurbitaceae.

The fact that the pollen tube in some of the Rubiaceae is intercellular in its mode of growth, coupled with the further fact that in *Houstonia* no micropyle is present, a condition due of course to the absence of the integument, led me to the belief that the course of the pollen tube in the latter also would be found upon examination to be intercellular. This hypothesis was strengthened again by the similarity of the topography of the ovary in *Richardsonia*, *Diodia*, and *Houstonia*, apart from the placental structure, together with the disposition of the ovules in the last named.

\* Lloyd, F. E. The Comparative Embryology of the Rubiaceae. *Memoirs of the Torrey Botanical Club*, 8: 27-112. *pl.* 5-15. 15 F 1902.

† The Pollen Tube in the Cucurbitaceae and Rubiaceae. *TORREYA*, 4: 86-91. *Je* 1904. Pertinent literature is here cited.

Accordingly, at my suggestion, Mr. Chester A. Mathewson undertook an examination of a lot of material which I had previously collected for the purpose, and has been able to follow the pollen tube from the papillae to the funicle of the ovule. A full account of Mr. Mathewson's observations will appear later when the work is completed. At the present it is of interest to point out that the expectation entertained by me has proved correct and that the course of the pollen tube is throughout intercellular. Through the stylar tissue and the stylar elements of the ovarian partition the tube moves precisely as described for *Richardsonia* and *Diodia*. At the lower edge of the stylar tissue the tube encounters the basal portion of the dissepiment. It then turns abruptly, pursuing a path at right angles, roughly speaking, to its previous course, but for only a short distance. It may turn out that this is not invariably the case, though it is certainly the rule, in which event the tube would penetrate into the tissue of the basal element of the partition directly. Before emerging into the ovule, as it would if it kept on in the direction described, namely at right angles to its stylar course, it turns again abruptly, penetrating from one to several layers deep, gradually turning so as to pursue a path parallel to the axis of the placental stalk. Through the parenchymatous mass of the placenta the path is less direct, but in the main leads with little irregularity to one or another of the ovules. On reaching one of these, the tube may emerge into the sinus between the ovule and the placenta and then repenetrate the ovule laterally; or, as I believe to be the more usual, the tube enters the ovule through the funicle. From this point it goes more or less obliquely and irregularly toward the egg pole of the embryo-sac, at least in the few cases in which the course has been followed. It will be of further interest to see if in any instances the course is through the chalazal tissues.

A further question presents itself. As is well known, *Houstonia* produces a goodly number of ovules in each of the two locules. These are distributed upon the knob-shaped placentae, which originate in a manner similar to the single ovules of the *Galieae* and in a similar position. It seems not unlikely that these ovules develop centrifugally, the ones placed nearest the

stylar partition maturing the embryo-sac somewhat earlier than those next in position, and these in turn earlier than the following and so on. If this should turn out to be the case, certain ovules should be first prepared to attract the entering pollen tubes on the theory that the direction of these is determined by the presence of a stimulant which works chemotactically upon them, a view advanced by Molisch and supported by my studies of the Rubiaceae upon physiological-anatomical grounds. This inference would have to be made in view of the fact that there appears to be no special conductive tissue within the placental parenchyma for the guidance of the tubes which, as above pointed out, travel through it.

The facts thus made out serve to emphasize the contention advanced by Murbeck, Longo and myself, to the effect that the phenomena observed in the behavior of the pollen tube in the various plants examined by us have a physiological meaning only. This view is opposed to that which was previously advanced by Treub and by Nawaschin, who ascribed rather a phylogenetic significance to the matter. The fact that in widely different families, including the Rosaceae, Cucurbitaceae, and Rubiaceae, as well as the so-called primitive dicotyledons, similar behaviors of the pollen tube have been observed, loosens the grasp of those who hope upon these grounds to construct a phylogeny of plants of even the most general kind.

## CONTRIBUTIONS TO THE RECORDED FUNGUS AND SLIME-MOULD FLORA OF LONG ISLAND

BY G. A. REICHLING

A list is given below, comprising a few additions to Dr. Jelliffe's Flora of Long Island in the fungi and myxomycetes. The specimens have been collected for the most part at Jamaica and Flushing during last summer. Flushing seems to have a particularly rich and interesting flora.

In the list the nomenclature of Macbride is employed for the myxomycetes. The localities are given with the names.